

WHAT IS CLAIMED IS:

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8/92  
1. A method of producing a protein in urine that degrades or detoxifies organic material, said method comprising:

(a) providing a non-human transgenic animal having stably integrated into its genome an exogenous gene encoding a protein that is detectable in urine and that degrades or detoxifies organic material.

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2. The method of claim 1, wherein said transgenic animal is a mammal.

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3. The method of claim 1, wherein said transgenic animal is selected from the group consisting of a pig, sheep, goat, cattle, rodent, rabbit, horse, dog, cat, bird and reptile.

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4. The method of claim 1, wherein said protein is an enzyme.

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5. The method of claim 4, wherein said enzyme is selected from the group consisting of the list of enzymes in Figure 7.

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6. The method of claim 1, wherein said organic material is feces, urine, microbe, a chemical pollutant or a by-product thereof, and a food product or a by-product thereof.

7. The method of claim 6, wherein said chemical pollutant is selected from the group consisting of an herbicide, pesticide and fertilizer.

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8. A non-human transgenic animal that produces in its urine a protein that degrades or detoxifies an organic material, wherein said non-human transgenic animal has stably

5 integrated into its genome an exogenous gene encoding a protein that degrades or detoxifies an organic material and that is detectable in urine.

9. The transgenic animal of claim 8, wherein said transgenic animal is a mammal.

10. The transgenic animal of claim 8, wherein said transgenic animal is selected from the group consisting of a pig, sheep, goat, cattle, rodent, rabbit, horse, dog, cat, bird and reptile.

11. The transgenic animal of claim 8, wherein said organic material is feces, urine, microbe, a chemical pollutant or a by-product thereof, and a food product or a by-product thereof.

12. The transgenic animal of claim 8, wherein said organic material is produced by said transgenic animal or by a different animal.

13. The transgenic animal of claim 11, wherein said chemical pollutant is selected from the group consisting of an herbicide, pesticide and fertilizer.

14. The transgenic animal of claim 8, wherein said protein is an enzyme.

15. The transgenic animal of claim 14, wherein said enzyme is selected from the group of enzymes listed in Figure 7.

16. A method of degrading or detoxifying organic material, comprising the steps of:

(a) providing a non-human transgenic animal having stably integrated into its genome an exogenous gene encoding a

protein that is detectable in urine and that degrades or detoxifies organic material; and

(b) contacting said organic material with said urine, thereby degrading and detoxifying said organic material.

5 17. The method of claim 16, wherein said contacting involves mixing said urine with said organic material.

10 18. The method of claim 16, wherein said contacting involves said non-human transgenic animal urinating on said organic waste.

15 19. The method of claim 16, wherein said transgenic animal is a mammal.

20 20. The method of claim 16, wherein said transgenic animal is selected from the group consisting of a pig, sheep, goat, cattle, rodent, rabbit, horse, dog, cat, bird and reptile.

25 21. The method of claim 16, wherein said organic material is selected from the group consisting of feces, urine, microbe, a chemical pollutant or a by-product thereof, and a food product or a by-product thereof.

30 22. The method of claim 21, wherein said chemical pollutant is selected from the group consisting of an herbicide, pesticide and fertilizer.

35 23. The method of claim 16, wherein said protein is an enzyme.

24. The method of claim 23, wherein said enzyme is selected from the group consisting of the enzymes listed in Figure 7.

25. A facility for containing animals, said facility comprising:

(a) at least one non-human transgenic animal having stably integrated into its genome an exogenous gene encoding a protein that is detectable in urine and that degrades or detoxifies organic material; and

(b) a structure for containing said animal within said facility.

26. The facility of claim 25, further comprising:

(c) at least one non-transgenic animal of the same or different species from said transgenic animal.

27. The facility of claim 25, wherein said transgenic animal is a mammal.

28. The facility of claim 25, wherein said transgenic animal is selected from the group consisting of a pig, sheep, goat, cattle, rodent, rabbit, horse, dog, cat, bird and reptile.

29. The facility of claim 25, wherein said transgenic animal is a mammal and wherein said non-transgenic animal is also an mammal.

30. The facility of claim 27, wherein said non-transgenic animal is a bird or reptile.

31. The facility of claim 25, which is selected from the group consisting of a farm, ranch, slaughter house, research facility and zoo.

32. The method of claim 25, wherein said organic material is selected from the group consisting of feces, urine, microbe, a chemical pollutant and a by-product thereof and a food product and a by-product thereof.

33. The method of claim 32, wherein said chemical pollutant is selected from the group consisting of an herbicide, pesticide and fertilizer.

5        34. An *in vivo* method of altering a substance in urine, said method comprising:

10        (a) producing a non-human transgenic animal having stably integrated into its genome an exogenous gene encoding a first substance that alters a second substance in the urine of said transgenic animal.

15        35. The method of claim 34, wherein said animal is a mammal.

20        36. The method of claim 34, wherein said transgenic animal is selected from the group consisting of a pig, sheep, goat, cattle, rodent, rabbit, horse, dog, cat, bird and reptile.

25        37. The method of claim 36, wherein said mammal is a pig.

30        38. The method of claim 34, wherein said first substance degrades said second substance.

35        39. The method of claim 38, wherein said first substance is a protein.

40        40. The method of claim 39, wherein said protein is an enzyme.

45        41. The method of claim 40, wherein said enzyme is selected from the group consisting of the enzymes listed in Figure 7.

42. A DNA construct for the production in the urine of a non-human transgenic animal, of a protein that degrades or detoxifies organic material, said construct comprising

(a) 5' expression regulating sequences, including urinary tract-specific promoter and enhancer sequences;

(b) cDNA or genomic DNA sequences encoding said protein, and a signal sequence effective in directing the secretion of said protein into the urine of transgenic animal; and

(c) 3' regulatory sequences, including a polyadenylation sequence, that results in the expression of said DNA sequences in urinary tract cells;

wherein a, b and c are operably linked in said DNA construct to obtain the production of said protein in said urine of said animal.

43. The DNA construct of claim 42, wherein (a) and/or (c) are sequences from the gene encoding a protein selected from the group consisting of uromodulin, uroplakin, renin, erythropoietin, apolipoprotein E, aquaporin, nephrocalcin, osteopontin-k, uropontin and urinary kallikrein.

44. The DNA of claim 42, wherein the protein of (b) is selected from the group consisting of the enzymes listed in Figure 7.

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B1

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B8

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